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Description

Arm Support with Mouse Pad

Cross Reference to Related Applications

[0001] This application claims priority to U.S. Provisional Application No. 60/472,646, filed on May 22, 2003, and entitled "ARM SUPPORT WITH MOUSE PAD," the entirety of which is incorporated herein by reference.

Background of Invention

[0002] The computer has become a popular tool for work, education, and entertainment. Widespread frequent and continuous use of computers, and in particular of the computer mouse and keyboard, can cause discomfort and sometimes injury due to repetitive motion and poor user posture. While a number of products have been invented and developed to improve the ergonomics of computer use and reduce the risk of discomfort and injury after long term use, existing products do not address some key requirements for widespread adoption of arm and mouse supports.

[0003] First, existing products and inventions are difficult to attach to the computer desk. Second, existing products and inventions are cumbersome to the user because they cannot be stored under the work surface of the desk while still attached to the desk when not in use. Third, existing products and inventions either do not support the mouse itself, requiring the mouse to be placed on the desk surface, or they directly align the mouse pad with the forearm support, making it impossible for users to comfortably alternate between operation of the keyboard, mouse, and other devices. Therefore, there exists a need for a device that addresses these disadvantages.

SUMMARY OF INVENTION

[0004] In one preferred embodiment, among others, a storable forearm support and mouse pad generally addresses the ergonomics of computer use and provides improvements in the comfort, safety and productivity of computer users. Specifically, the present invention, as one preferred embodiment, among others, is a storable forearm support and mouse pad, which attaches easily to the workstation desk, is designed to be easily stored under the desk while still attached to the desk when not in use, and is adjustable for the operation of the mouse, keyboard or other

hand-operated devices, or for the operation of a combination of the aforementioned devices simultaneously, and for transitioning between the operation of any combination of such devices.

[0005] Additionally, the present invention, as one preferred embodiment, easily attaches to the surface of the computer workstation or desk, easily stores under the desk while still attached to the desk when not in use, and improves the productivity of the computer user by providing a more comfortable and safer means of operating the mouse and other devices while working at a computer workstation. One aspect of the device in accordance with the present invention includes a clamping mechanism that enables easy attachment to the computer workstation without damaging the surface of the workstation desk. The design and functionality also allows it to be easily stored away under the surface of the workstation desk while still attached to the desk making it unobtrusive when the workstation desk is being used for other purposes. The device is designed to offer a higher degree of ergonomic flexibility to computer users. More specifically, users choose both the most comfortable seating position and the most comfortable arm, wrist and hand positions for effective

operation of the mouse, keyboard and other hand-operated devices. The device allows the user to comfortably lean back in the chair while surfing the Internet or performing other more relaxed activities at the computer. Additionally, the device also allows the user to lean forward while typing or performing more intensive work with the mouse or other devices on or adjacent to the desk such as a computer keyboard. Because the mouse support is rotationally connected to the forearm support, the device allows the user to comfortably position the forearm rest and mouse pad for simultaneous use of the mouse and keyboard and other hand-operated devices, while minimizing strain to the wrist, neck and shoulders, thereby reducing fatigue and the risk of potential injury associated with long term use and repetitive motion. In addition, the device allows the user to easily transition to activities which require closer proximity to the desk (such as typing) without removing the forearm from the forearm rest, thereby retaining the advantages of the forearm rest during these activities. Therefore, the device offers the user consistent support while comfortably operating a mouse, a keyboard, other hand-operated devices, or a combination of the aforementioned devices simultane-

ously, and for transitioning between the operation of any combination of such devices.

[0006] The present invention in a further preferred embodiment, among others, includes a storable forearm support and mouse pad device to be attached to a workstation desk next to a computer keyboard. The device supports the forearm of the computer user as well as the computer mouse and comprises a support clamp, a support structure comprising three sturdy shafts, a mouse pad, and a forearm rest. The support clamp is specifically designed to enable the user to easily attach and secure the storable forearm support and mouse pad to the workstation desk and to support the weight of the mouse, and the user's forearm, wrist, and hand. The mouse pad is directly attached to the top side of the first support shaft, or the mouse pad support shaft, which is rotationally connected at one end to the support clamp and at the opposite end to the second support shaft, or the central support shaft. The connection between the mouse pad support shaft and the support clamp is designed to allow full 360 degree rotation around the first swivel joint, or the support clamp swivel joint, with enough clearance from the lower surface of the workstation desk to enable the entire storable fore-

arm support and mouse pad assembly to be stored neatly under the workstation desk while still attached to the desk when it is not in use. The connection between the mouse pad support shaft and the central support shaft is designed to allow approximately 180 degrees of rotation around the second swivel joint, or the central swivel joint, to enable the flexible lateral positioning of the forearm rest with respect to the mouse pad for the optimal comfort of the user. The opposite end of the central support shaft is rotationally interconnected to the third support shaft, or the forearm support shaft. The connection between the central support shaft and the forearm support shaft is designed to allow full 360 degree rotation around the third swivel joint, or the forearm swivel joint, with enough clearance from the top surface of the central support shaft and the mouse pad to allow the forearm rest to rotate a full 360 degrees allowing the user to adjust the forearm rest to any angle for optimal comfort in using either the keyboard, or the mouse, or any other hand-operated device, or any combination of devices. The forearm rest is attached directly to the top surface of the forearm support shaft. The top surface of the mouse pad may be made of a textured material to enable the use of a typ-

ical computer mouse. The top surface of the forearm rest may be made of a soft or padded material to provide comfort to the user's forearm during operation. The storable forearm support and mouse pad allows the user to operate the mouse, keyboard, other hand-held devices, or a combination of the aforementioned devices simultaneously, and for transitioning between the operation of any combination of such devices, either while leaning back in the chair for more relaxed workstation activities or while leaning forward in the chair for more intensive workstation activities.

[0007] By using the present invention, the user will enjoy improved comfort and safety, and improved productivity as a result of reduced eye strain caused by proximity to the computer monitor, and reduced fatigue caused by poor posture. The device offers the user consistent support while comfortably operating a mouse, a keyboard, other hand-operated devices, or a combination of the aforementioned devices simultaneously, and for transitioning between the operation of any combination of such devices. The device is specifically designed with a clamping mechanism that makes it very easy to install and to adjust to different workstation desks. When not in use, the de-

vice neatly stores under the workstation desk while still attached to the desk allowing the operator to perform other tasks at and in proximity to the workstation desk without obstruction.

[0008] The device improves the productivity of the computer user by providing a more comfortable and safer means of working at a computer workstation. More specifically, the device provides a storable forearm support and mouse pad which (1) allows the user to comfortably operate the mouse of the computer at a comfortable position and a safe distance from the computer monitor, (2) may be easily and safely secured to a workstation desk next to a computer, (3) is adjustable for the operation of the mouse, keyboard or other hand-operated devices, or for the operation of a combination of the aforementioned devices simultaneously, and for transitioning between the operation of any combination of such devices, (4) neatly stores under the surface of the workstation desk while still attached to the desk when not in use so as to be completely unburdening to the user when performing other activities which do not require the invention at or in proximity to the workstation desk, and (5) may include a cushioning element for the storable forearm support for the

increased comfort of the user, and a textured surface for the mouse pad to permit the use of a standard computer mouse.

[0009] The above is a general description that describes certain features of the present invention such that the reader may better understand the following, more detailed description. However, it is understood that the following detailed description will describe additional features which will contribute to the overall value of the device, and that the terms, wording and phrasing used in both the above general description and the following detailed description should not be considered limiting. It is further understood that the following is a detailed description of a preferred embodiment referred to as Mouse-at-Ease, however, the scope of the present invention is not limited to any specific embodiment, and as such, not limited in its construction, in its arrangement of components, in its dimensions, or in its material makeup.

Brief Description of Drawings

[0010] The following figures are provided:

[0011] *Fig. 1* is a top view of the arm support with pad, in accordance with one preferred embodiment, shown in an oper-

ating position with the forearm rest partially extended. The figure includes an optional mouse basket, a mouse (shown resting on the mouse pad), a possible placement of a keyboard, and a workstation desk surface.

[0012] *Fig. 2* is a perspective view of the support clamp portion of the arm support with pad of Fig. 1. The figure includes the main structure of the support clamp, the sturdy adjustment shaft, the adjustment bolt and the post that connects the support clamp to the mouse pad support shaft. The figure also includes a partial view of the mouse pad support shaft.

[0013] *Fig. 3(a)* is a side cross-sectional view of the arm support with pad of Fig. 1 in a less extended stored position under the workstation desk. The figure includes the workstation desk.

[0014] *Fig. 3(b)* is a top view of Fig. 3(a) The figure also includes the optional basket and the mouse (shown resting in the optional basket).

[0015] *Fig. 4(a)* is a side cross-sectional view of the arm support with pad of Fig. 1 in a fully extended stored position under the workstation desk. The figure includes the mouse (shown resting on the mouse pad), and workstation desk.

[0016] *Fig. 4(b)* is a side partial cut-away perspective view of the

arm support with pad of Fig. 1 shown in its fully extended operating position. The figure includes a partial view of the optional mouse basket.

[0017] *Fig. 5(a)* is a perspective view of the support structure portion of the arm support with pad of Fig 1. The figure includes the sturdy shaft, adjustment bolt and the post that connects the support structure to the support clamp.

[0018] *Fig. 5(b)* is an exploded view of Fig. 5(a).

DETAILED DESCRIPTION

[0019] The present invention preferably comprises three major components [Fig. 1,4(b),2], a support clamp *1 3 7-9 28-33*, a pad *15*, and a forearm rest *14*, that are interconnected by a supporting structure. An optional basket *16*, attached to the pad *15*, is available for storage of for example, a mouse when it is not being used.

[0020] The support clamp *1 3 7-9 28-33* [Fig. 2,4(a)] may comprise a main clamp element*1 28 29* that positions the clamp at the top surface *18* and front edge *20* of a workstation desk *18-20* and supports the other elements of the support clamp *1 3 7-9 28-33*, which comprises a sturdy adjustment shaft *3* that is connected to a main clamp element*1 28 29* by a pivoting arm *31-33*, a screw nut *7* that fastens the

pivoting arm against a lower surface *19* of a workstation desk *18-20*, an adjustment bolt *8* that adjusts the gap between the top surface of the adjustment bolt *8* and a bottom surface *2* of the main clamp element*1 28 29* to match the thickness of the workstation desk *18-20*, and an alignment post *9* that connects the support clamp *1 3 7-9 28-33* to a corresponding rotating cylinder *12* on a pad support shaft *11*.

[0021] The main clamp element*1 28 29* [Fig. 2] may comprise an L-shaped bar *1* which may be welded to angled bracket *28* with protruding threaded cylinder*29* to form a partial C-shaped structure that is positioned against the top surface *18* and front edge *20* of the workstation desk *18-20* [Fig. 4(a)].

[0022] A second element of the support clamp *1 3 7-9 28-33*, the adjustment shaft element *3 8 9* may comprise an adjustment shaft *3*, an adjustment bolt *8*, and an alignment post *9* that connects the support clamp to the pad support shaft *11*. The rotating cylinder *12* may be welded to the top surface of the pad support shaft *11* such that the circular hole in the rotating cylinder *12* and the circular hole in the pad support shaft *11* are aligned. The upper portion of the alignment post *9* may be inserted in the vertical un-

threaded circular hole in the adjustment shaft *3*. The lower portion of the alignment post *9* may be inserted through the circular holes in the rotating cylinder *12*, the pad support shaft *11*. A spring clamp *13* may be used to hold the rotating cylinder *12* and pad support shaft *11*, and the alignment post *9* together while allowing the rotating cylinder *12* and pad support shaft *11* to rotate freely around the longitudinal axis of the alignment post *9*.

[0023] The pivoting arm *31-33* [Fig. 2] may comprise two supporting curved shafts *33* rotationally attached to a U-shaped element *31*, and a threaded bolt *32*. The main clamp element*1 28 29* [Fig. 2] may be attached to the adjustment clamp element *3 8 9* by simultaneously aligning the horizontal circular hole in the adjustment shaft *3* to the horizontal circular hole at the top end of the alignment post *9*.The support clamp *1 3 7-9 28-33* is integral to the flexibility of operation and the structural robustness of the present invention. The design of the clamp provides stable and consistent support over all 360 degrees of rotation around the swivel joint created by the alignment post *9* and the corresponding rotating cylinder *12*.

[0024] Assembly of the support clamp *1 3 7-9 28-33* [Fig. 2] may be completed by screwing the adjustment bolt *8* into the

vertical threaded hole in the adjustment shaft *3* such that the circular top of the adjustment bolt *8* is on the top side of the adjustment shaft *3* between the adjustment shaft *3* and the bottom surface *2*of the main clamp element *1*.

[0025] The support clamp *1 3 7-9 28-33* may be attached to the workstation desk *18-20* [Fig. 4(a)] by placing the support clamp *1 3 7-9 28-33* on the workstation desk *18-20* such that the bottom surface *2*of the main clamp element *1* is adjacent to the top surface *18* of the workstation desk *18-20*, the vertical inner surface *4* of the main clamp element *1* is adjacent to the front edge *20* of the workstation desk *18-20*, and the top of the adjustment bolt *8* is adjacent to the bottom surface *19* of the workstation desk *18-20*.

[0026] The support clamp *1 3 7-9 28-33* may be adjusted and affixed to the workstation desk by adjusting the adjustment bolt *8* to fit the thickness of the workstation desk *18-20* [Fig. 4(a)], then tightening the screw nut*7* to put pressure against the pivoting arm *31-33* such that the pivoting arm *31-33* pushes against the bottom surface *19* of the workstation desk *18-20,* and then tightening the adjustment bolt *8* against said bottom surface *19*.The downward force created by the weight of the design and the forearm of the

user is distributed around three pressure points on the clamp, the main clamp element *1 28 29*, the pivoting arm *31-33*, and the adjustment fastener *8*. The three points work to create an axis of rotation around their center that creates a self-locking mechanism, which increases the grasp of the clamp as more downward force is applied to Mouse-at-Ease.

[0027] The firmness of the support clamp's grasp on the work-station desk *18-20* is enabled by the self-locking mechanism described above, enabling the user to securely fasten the supporting clamp *1 3 7-9 28-33* to the workstation desk *18-20* without excessive tightening of the screw nut and fastening bolt *7 8*, thus making it very easy to mount, dismount, and laterally position the design on the work-station desk *18-20*.

[0028] Because the present invention is designed to support significant weight, large forces are exerted on the support clamp *1 3 7-9 28-33* at maximum load. The design of the support clamp *1 3 7-9 28-33* distributes this pressure over a large area of the workstation desk *18-20* thereby minimizing the possibility of damage to the workstation desk *18-20* during normal operation.

[0029] The support clamp *1 3 7-9 28-33*, pad *15*, and forearm rest

14 are interconnected by a support structure [Fig. 4(b)] consisting of three sturdy shafts comprising the pad support shaft *11*, the central support shaft *21*, and the forearm support shaft *10*, which are interconnected at the pivot points by the clamp swivel joint *9 12 13*, the central swivel joint *22 27 26*, and the forearm swivel joint *24 25 23* respectively. The freedom of rotation provided by the three sturdy shafts *11 21 31* and the swivel joints *9 12 13*, *22 27 26*, *24 25 23* allows the design to be adjusted to comfortable operating positions for the operation of the pad *15* or mouse *6*, the keyboard *5*, other hand-operated devices (not shown), or for the simultaneous operation of the pad *15* or mouse *6* , and keyboard *5* or other hand-operated devices (not shown). The freedom of rotation also facilitates easy storage of the Mouse-at-Ease underneath the workstation desk *18-20* when not in use.

[0030] Three sturdy shafts *11 21 10* make up the support structure of the design. The vertical offsets between the shafts, and the lengths of the shafts have been carefully planned to provide the high operative flexibility. The forearm support shaft *10* supporting the forearm rest *20* and the pad support shaft *11* supporting the pad *15* are allowed full 360 degree rotation around the forearm swivel joint *24 25*

23 and the clamp swivel joint *9 12 13* respectively. The central support shaft *21* can rotate 180 degrees around the central swivel joint *22 27 26*. The freedom of rotation of the shafts allows the user to operate the design in virtually any operating position desired ensuring comfortable operation of the computer mouse, keyboard and other devices [Fig. 1,3].

[0031] The 180 degree rotation of the central shaft *21* around the central swivel joint *22 27 26* determines the proximity of the forearm from the desk*18–20* [Fig. 1,3]. The user can easily transition to activities which require closer proximity to the workstation desk *18–20* (such as typing) without removing the forearm from the forearm rest *14*, thereby retaining the advantages of the forearm rest *14* during these activities.

[0032] The support structure is designed such that the top of the forearm rest *14* is lower than the bottom surface *19* of the workstation desk *18–20* [Fig. 4(a)]. The lower position of the forearm rest *14* combined with the freedom of rotation of the support shafts *11 21 10*, allows the design to be conveniently stored under the workstation desk *18–20* while still attached to the workstation desk *18–20* when not in use. Because the design is mounted beside the user

during normal operation, when it is stored under the workstation desk *18-20*, it does not interfere with the user's knees under the workstation desk *18-20*. This feature, combined with the low-profile design of the upper portion of the support clamp *1*, makes the storage of the design completely unburdening to the user when performing other activities which do not require the design at or in proximity to the workstation desk *18-20*.

[0033] The vertical offset between the pad support shaft *11*, the central support shaft *21*, and the forearm support shaft *10* [Fig 4(b)], determine the elevation of the forearm rest *14* from the pad *15*. The carefully chosen offset allows the mouse *6* to be operated with the forearm resting and the wrist in line with the forearm, helping to avoid the painful problems associated with hyperextension and hyper flexion.

[0034] Computer users commonly suffer from eye strain, which is aggravated by the user's proximity to the computer monitor. Working too close to the computer monitor can not only be tiring, but with some computer monitors, it can also be unsafe. When fully extended [Fig. 4(b)] to the full length of the three support shafts *11 21 10*, in one implementation, among others, the Mouse-at-Ease will stretch

about twenty inches from the vertical inner surface *4* [Fig. 4b]of the main clamp element *1*. This extension capability allows the user to work effectively and comfortably for long periods of time at the workstation, at a more comfortable and safer distance from the computer monitor.

[0035] The forearm support shaft *10* may be welded to the forearm alignment post *24*. The central support shaft *21* may be welded to the central alignment post *22* [Fig. 5(b)].

[0036] The pad support shaft *11* may be attached to the support clamp *1 3 7-9 28-33* by attaching one end of the pad support shaft *11* to the support clamp *1 3 7-9 28-33* as described above [Fig. 5(a)]. The opposite end of the pad support shaft *11* may be attached to one end of the central support shaft *21* [Fig. 5(b)] by sliding the central alignment post *22* through the cylindrical spacer *27* and through the vertical circular hole in the pad support shaft *11*, and pressing the clamping washer *26* to the bottom end of the central alignment post *22*. The opposite end of the central support shaft *21* may be attached to one end of the forearm support shaft *10* [Fig. 5(b)] by sliding the forearm alignment post *24* through the cylindrical spacer *25* and through the vertical circular hole in the central support shaft *21*, and pressing the clamping washer *23* to

the bottom end of the forearm alignment post *24*.

[0037] The design preferably should be able to withstand significant downward force exerted at the furthest edge of the forearm rest *14*, which creates maximum torque on the design when fully extended. When fully extended, support shafts *11 21 10* and support clamp *1 3 7-9 28-33* of the design are designed to support significant force exerted at the furthest point on the forearm rest *14* [Fig. 4(b)].

[0038] The support structure [Fig. 4(b)] is designed to provide free rotation around the swivel joints *9 12 13*, *22 27 26*, *24 25 23* even at the specified maximum downward force, thereby enabling effortless movement and adjustment over its full range under all specified operating conditions.

[0039] The pad *15* may be attached to the top surface of the pad support shaft *11*, between the support clamp *1 3 7-9 28-33* and the central support shaft *21* [Fig. 4(b)]. The pad *15* may be designed of plastic or other sturdy, but flexible material.

[0040] The pad *15* was carefully selected to be large enough to accommodate a wide range of mouse placement or other devices. In combination with the forearm rest *14* and the support structure *11 21 10*, the pad *15* is designed to permit the operation of the mouse with just the lateral rota-

tion of the wrist. By adjusting the rotation angle of the pad *15*, the forearm rest *14* and the central support shaft *21* [Fig 1,3]. , the user can choose the most comfortable position of the forearm rest *14* with respect to the pad *15*, and operate the mouse effectively and comfortably over its full range of motion with effortless rotation of the wrist. The top surface of the pad *15*, may be made of a textured material to enable the use of a typical computer mouse.

[0041] The forearm rest *14* may consist of a wide portion and a narrow portion. The forearm rest *14* may be fastened to the top surface of the forearm support shaft *10* such that the wider portion of the forearm rest *14* is furthest from the central swivel joint *22 27 26* when the design is fully extended. The forearm rest *14* may be designed of plastic or other sturdy, but flexible material.

[0042] In contrast to other designs, which provide support for only the elbow, the shape of the forearm rest *14* has been chosen to provide a comfortable resting place for the user's entire forearm [Fig. 1,3]. By providing support for the whole forearm, the weight of the arm and shoulder are distributed over a larger area of the arm. A less ample support rest would result in greater pressure to be applied

over a smaller area, causing fatigue and discomfort to develop more quickly while operating the mouse.

[0043] The wide base and resting surface of the forearm rest *14* [Fig. 9] allow the user to freely choose where to place the forearm during use. It is very important for the user to be able to choose the most comfortable position(s) [Fig. 1,3] that enable use of the mouse *6*, the keyboard *5*, or other hand-operated computer peripherals (not shown.) Some activities at the workstation will require the user to smoothly transition to and from the forearm rest *14*. The design of the forearm rest *14*, combined with the flexibility provided by the support structure *11 21 10* and swivel joints *9 12 13*, *22 27 26*, *24 25 23* to optimize its relative position and angle with respect to the workstation desk *18-20*, makes it easy for the user to comfortably transition to and from the forearm rest *14* during operation of the mouse *6*, keyboard *5* and other devices (not shown.) The top surface of the forearm rest [Fig. 4(b)] may be made of a soft or padded material to provide comfort to the user's forearm during operation.

[0044] The design may include an optional basket *16* [Fig. 1, 3, 4(b)], in which the mouse *6* or other hand-operated devices can be placed when not being used. The basket *16* is

attached to the pad *15* by inserting the metal pins *17*, that are part of the basket *16*, into the corresponding holes in the pad *15*. The basket *16* can be placed on either the left or right side of the pad *15*, as preferred by the user.

[0045] Other preferred embodiments are also included within the scope of the present invention, as will become clear to those skilled in the art of the present invention. The above-described embodiments of the present invention, particularly, any "preferred" embodiments, are merely possible examples of implementations, merely set forth for a clear understanding of the principles of the invention. Many variations and modifications may be made to the above-described embodiments of the invention without departing substantially from the spirit and principles of the invention. For example, alternate construction materials and structures for connecting elements are contemplated. All such modifications and variations are intended to be included herein within the scope of this disclosure and the present invention.